I claim:

1. A capacitive sensing system comprising:

a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) port;

a conductive sense element in electrical communication with the port, and

a resistance element in electrical communication with the sense element to form an electrical pathway from the sense element to an electrical discharge point;

wherein the microcontroller is further operable to:

at a first time, charge the sense element by causing a selected voltage to be placed on the port;

at a second time, cease placing the selected voltage on the port;

thereafter, measure voltage at the port, the voltage at the port being representative of voltage at the sense element; and

measure a parametric value required for voltage at the sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the sense element and a first object that may be in contact or proximity with the sense element, whereby the parametric value is representative of contact or proximity between the sense element and the first object.

2. The system of claim 1 wherein the parametric value is time.

3. The system of claim 2 wherein time is measured using a clock element inherent to the microcontroller.

4. The system of claim 1 wherein the parametric value is a number of discharge pulses.

5. The system of claim 1 wherein the microcontroller is further operable to perform digital signal processing on signals derived from the sense element.

6. The system of claim 5 wherein the signal processing includes resolution enhancement.

7. The system of claim 5 wherein the signal processing includes automatic calibration.

8. The system of claim 5 wherein the signal processing includes continuous calibration.

9. The system of claim 5 wherein the signal processing includes noise reduction.

10. The system of claim 5 wherein the signal processing includes pattern recognition.

11. The system of claim 10 wherein the signal processing comprises the synthesis of at least one virtual sensor capable of detecting selected patterns of contact or proximity between the first object and the sense element.

12. The system of claim 10 wherein the signal processing comprises the synthesis of multiple virtual sensors from a single sense element, each virtual sensor being capable of detecting selected patterns of contact or proximity between the first object and the sense element.

13. The system of claim 11 or 12 adapted for embedding in a second object.

14. The system of claim 13 wherein the second object is a toy.

15. The system of claim 13 wherein the selected patterns of contact or proximity include any of activity, hold, squeeze, tickle, pet, slap, rhythm or bounce patterns.

16. The system of claim 1, 11 or 12 wherein the microcontroller is further operable to receive separate signals from a plurality of sense elements, each in electrical communication with the port.

17. The system of claims 7 or 8 wherein the microcontroller is further operable to:

detect, at power-up, a first stable value of voltage at the sense element;

designate that first detected stable value as an initial calibration value;

increment, at a fixed interval, the initial calibration value;

thereafter, continuous examine detected values; and

when a new stable value lower than a current calibration value is detected, replace the current calibration value with the new stable value.

18. The system of claim 6 wherein the signal processing comprises resolution enhancement by:

taking multiple timing-based measurements of the parametric value, using different, selected timing offsets; and

then averaging across the multiple timing-based measurements.

19. The system of claim 18 wherein the resolution enhancement further comprises:

running a timing loop iteratively with different, selected timing delays; and

then deriving an average value from the multiple timing-based measurements thereby obtained.

20. The system of claim 1 wherein the sense element is any of a conductive plate, strip, fabric, textile, thread, coating, or ink.

21. A method of capacitive sensing, the method comprising:

providing a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) port;

providing a conductive sense element in electrical communication with the port, and

providing a resistance element in electrical communication with the sense element to form an electrical pathway from the sense element to an electrical discharge point;

and configuring the microcontroller to:

at a first time, charge the sense element by causing a selected voltage to be placed on the port;

at a second time, cease placing the selected voltage on the port;

thereafter, measure voltage at the port, the voltage at the port being representative of voltage at the sense element; and

measure a parametric value required for voltage at the sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the sense element and a first object that may be in contact or proximity with the sense element, whereby the parametric value is representative of contact or proximity between the sense element and the first object.

22. The method of claim 21 wherein the parametric value is time.

23. The method of claim 22 wherein time is measured using a clock element inherent to the microcontroller.

24. The method of claim 21 wherein the parametric value is a number of discharge pulses.

25. The method of claim 21 further comprising: configuring the microcontroller is to perform digital signal processing on signals derived from the sense element.

26. The method of claim 25 wherein the signal processing includes resolution enhancement.

27. The method of claim 25 wherein the signal processing includes automatic calibration.

28. The method of claim 25 wherein the signal processing includes continuous calibration.

29. The method of claim 25 wherein the signal processing includes noise reduction.

30. The method of claim 25 wherein the signal processing includes pattern recognition.

31. The method of claim 30 wherein the signal processing comprises: synthesizing at least one virtual sensor capable of detecting selected patterns of contact or proximity between the first object and the sense element.

32. The method of claim 30 wherein the signal processing comprises: synthesizing multiple virtual sensors from a single sense element, each virtual sensor being capable of detecting selected patterns of contact or proximity between the first object and the sense element.

33. The method of claim 31 or 32 adapted for embedding in a second object.

34. The method of claim 33 wherein the second object is a toy.

35. The method of claim 33 wherein the selected patterns of contact or proximity include any of activity, hold, squeeze, tickle, pet, slap, rhythm or bounce patterns.

36. The method of claim 21, 31 or 32 further comprising: configuring the microcontroller to receive separate signals from a plurality of sense elements, each in electrical communication with the port.

37. The method of claims 27 or 28 further comprising: configuring the microcontroller to:

detect, at power-up, a first stable value of voltage at the sense element;

designate that first detected stable value as an initial calibration value;

increment, at a fixed interval, the initial calibration value;

thereafter, continuous examine detected values; and

when a new stable value lower than a current calibration value is detected, replace the current calibration value with the new stable value.

38. The method of claim 26 wherein the signal processing further comprises resolution enhancement by:

taking multiple timing-based measurements of the parametric value, using different, selected timing offsets; and

then averaging across the multiple timing-based measurements.

39. The method of claim 38 wherein the resolution enhancement further comprises:

running a timing loop iteratively with different, selected timing delays; and then deriving an average value from the multiple timing-based measurements thereby obtained.

40. A capacitive sensing system capable of sensing the presence of a non-conductive object interspersed between a sense element and electrical ground, the system comprising:

a microcontroller, capable of being connected with an electrical power source and having at least one digital logic input/output (I/O) port;

a conductive sense element in electrical communication with the port, and

a resistance element in electrical communication with the sense element to form an electrical pathway from the sense element to an electrical discharge point;

wherein the microcontroller is operable to:

at a first time, charge the sense element by causing a selected voltage to be placed on the port;

at a second time, cease placing the selected voltage on the port;

thereafter, measure voltage at the port, the voltage at the port being representative of voltage at the sense element; and

measure a parametric value required for voltage at the sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the sense element and the non-conductive object, whereby the parametric value is representative of contact or proximity between the sense element and the object.

41. A capacitive sensing system comprising:

a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) port; and

a conductive sense element in electrical communication with the port;

wherein the microcontroller is further operable to:

at a first time, discharge the sense element;

at a second time, begin charging the sense element by placing a selected voltage on the port;

thereafter, measure voltage at the sense element; and

measure a parametric value required for voltage at the sense element to increase to a value above a threshold value, the parametric value being representative of an effective capacitance formed by at least the sense element and a first object that may be in contact or proximity with the sense element, whereby the parametric value is representative of contact or proximity between the sense element and the first object.

42. A non-contact object identification system, comprising:

a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) port;

at least two conductive sense elements in electrical communication with the port, the at least two conductive sense elements forming a binary-coded identification pattern and

a resistance element in electrical communication with each sense element to form an electrical pathway from each sense element to an electrical discharge point;

wherein the microcontroller is further operable to:

at a first time, charge the sense element by causing a selected voltage to be placed on the port;

at a second time, cease placing the selected voltage on the port;

thereafter, measure voltage at the port, the voltage at the port being representative of voltage at the sense element; and

measure a parametric value required for voltage at the sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the sense element and a first object that may be in contact or proximity with the sense element, whereby the parametric value is representative of contact or proximity between the sense element and the first object; wherein:

when an object having a corresponding binary-coded identification pattern is aligned with the binary-coded identification pattern formed by the sense elements, the alignment is detected by the sense elements and the microcontroller signals identification of the object.